

Chapter II Wetland Types

A number of classification systems are currently used to distinguish major wetland types in the U.S. The following broad categories classify wetlands according to their location:

Palustrine: the majority of vegetated freshwater wetlands, such as forested wetlands, marshes, and swamps.

Marine: areas along the coast that include shorelines, shallow water areas, and aquatic beds.

Estuarine: wetlands located in sheltered coastal areas where fresh and salt waters mix, such as salt marshes and mangrove swamps.

Riverine or Riparian: freshwater wetlands bordering rivers and streams.

Lacustrine: wetlands bordering lakes, including the shallow, near-shore areas without plants.

Wetlands are distributed worldwide and are found in many climates, from the tropics to the tundra. Several types of wetlands are found in the U.S. – *coastal marshes* and a variety of *freshwater* wetland systems (marshes, forested and shrub swamps, bogs, wet meadows, etc.).

DISTINGUISHING WETLAND TYPES

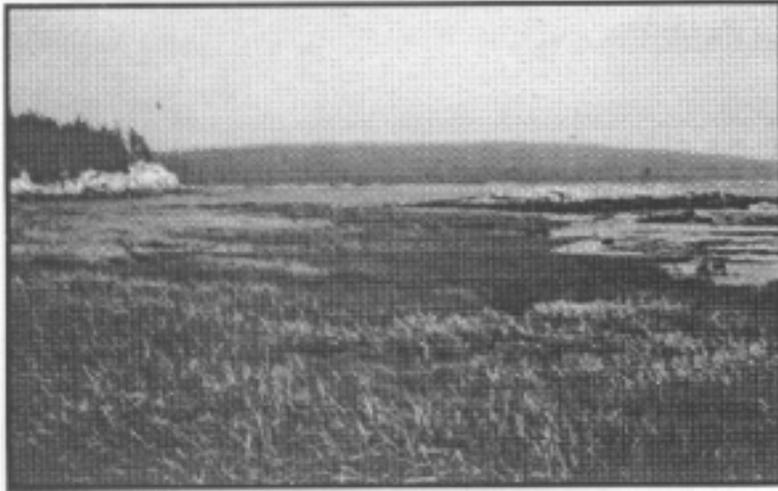
The following categories of wetlands are those common to New England. You can use this section to help you identify the type of wetland you'll be visiting on your field trip. You can also use the illustrations in this chapter to identify plants characteristic of each wetland type.



Forested wetlands are the most common wetland type in New England.

Coastal Wetlands

Coastal wetlands are found along all the U.S. coasts and make up approximately 5% of all wetlands. Since many of the nation's largest cities are located along the coast, these wetlands are especially vulnerable to development pressures.



saltwort/glasswort

SALT MARSHES

Salt marshes occur almost continuously along the east coast, in protected areas on the west coast, and in the Gulf of Mexico and Alaska. These areas are periodically flooded by saline or brackish waters due to tidal cycles. Plants and animals inhabiting salt marshes are adapted to the stressful environment of the marshes, including fluctuations in salinity, periodic and variable water inundation due to the tides, and extremes in temperature as tides rise and fall. Salt marshes are dominated by salt-tolerant plants, called *halophytes*, resembling a coastal “sea of grass” that filter and circulate nutrients.

Salt marshes are one of the most productive ecosystems in the world. Tiny pieces of plant and animal matter called *detritus* form the basis of the salt marsh food chain. This material is decomposed by fungi and bacteria which are then consumed by other organisms along the food chain such as plankton, clams, fiddler crabs, snails, insect larvae, and some fish. Almost half of this decomposed organic material remains in the marsh where it accumulates over time to form marsh peat, a mixture of organics, mud, clay, or sand. Salt marshes absorb much of the water from ocean surges during severe storms and this helps to reduce damage from erosion and flooding.

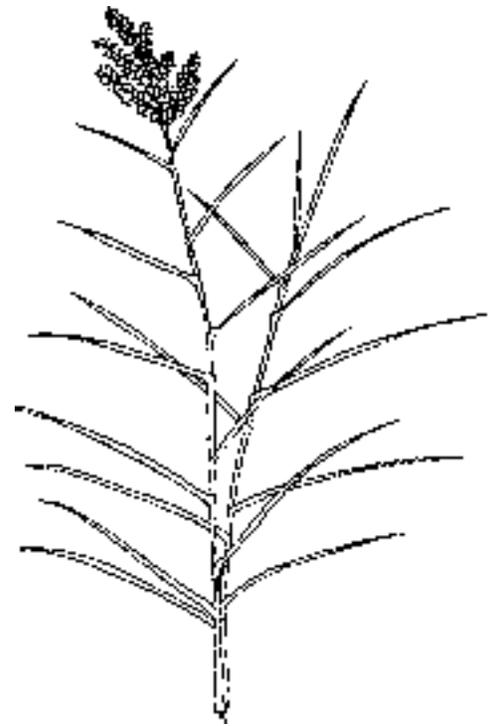


TIDAL BRACKISH MARSHES

Tidal brackish marshes are transitional areas between salt marshes and tidal freshwater marshes. Because these wetlands are less saline than salt marshes, they allow for a greater diversity of plant and animal species incapable of tolerating the extreme salinity found in salt marshes.

Characteristic Plants for Salt Marshes

<u>Common name</u>	<u>Scientific name</u>
<u>Low marsh</u>	
smooth cordgrass	<i>Spartina alterniflora</i> (tall form)
<u>High marsh</u>	
smooth cordgrass	<i>Spartina alterniflora</i> (short form)
salt marsh hay	<i>Spartina patens</i>
spike grass	<i>Distichlis spicata</i>
black grass	<i>Juncus gerardii</i>
sea lavender	<i>Limonium nasbii</i>
saltwort or glasswort	<i>Salicornia europaea</i>



spike grass



sea lavender



smooth cordgrass

Inland Wetlands

The majority of wetlands in the United States (95%) are inland wetlands. They occur throughout the interior of the country and are commonly found along the banks of rivers and streams, the margins of lakes and ponds, or as isolated depressions surrounded by dry land. The following are freshwater wetland types characteristic of New England.

FRESHWATER MARSHES

Freshwater marshes are dominated by *herbaceous* (non-woody) plants which may emerge above the water, float on the surface, or remain completely submerged. Water levels range from about three feet to six inches or less. Surface water may be entirely absent during late summer or excessively dry periods. Marshes generally have sources of water other than direct precipitation, such as groundwater seeps and streams.

Marshes provide habitat for a variety of species because of their abundant food supply, vegetative cover, and superior nesting habitat. Migratory waterfowl especially use marshes for nesting and wintering areas.



arrow arum



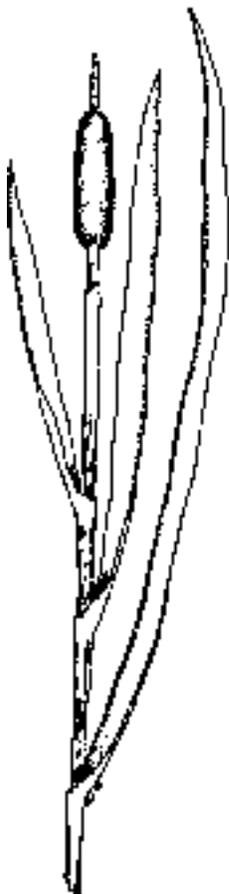
burreeds

Characteristic Plants for Freshwater Marshes

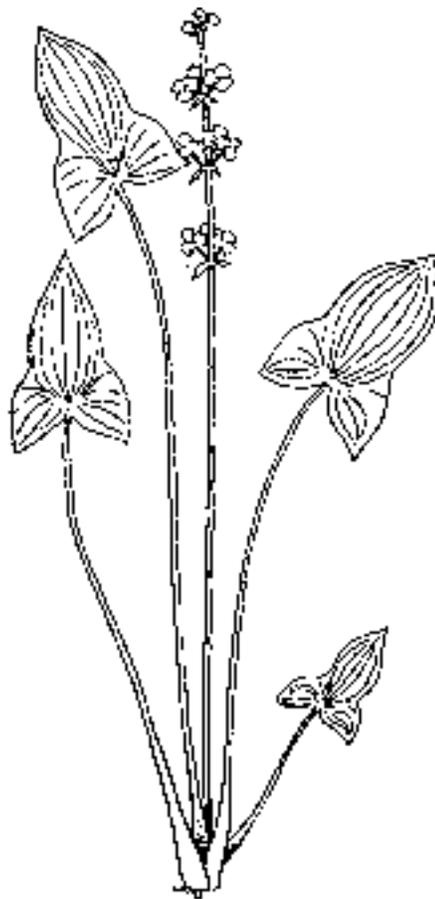
<u>Common name</u>	<u>Scientific name</u>
soft-stem bulrush	<i>Scirpus validus</i>
sedges	<i>Carex spp.</i>
burreeds	<i>Sparganium eurycarpum</i>
rushes	<i>Juncus spp.</i>
broad-leaved cattail	<i>Typha latifolia</i>
narrow-leaved cattail	<i>Typha angustifolia</i>
arrow arum	<i>Peltandra virginica</i>
arrowheads	<i>Sagittaria latifolia</i>
wild rice	<i>Zizania aquatica</i>



soft-stem bulrush



broad-leaved cattail



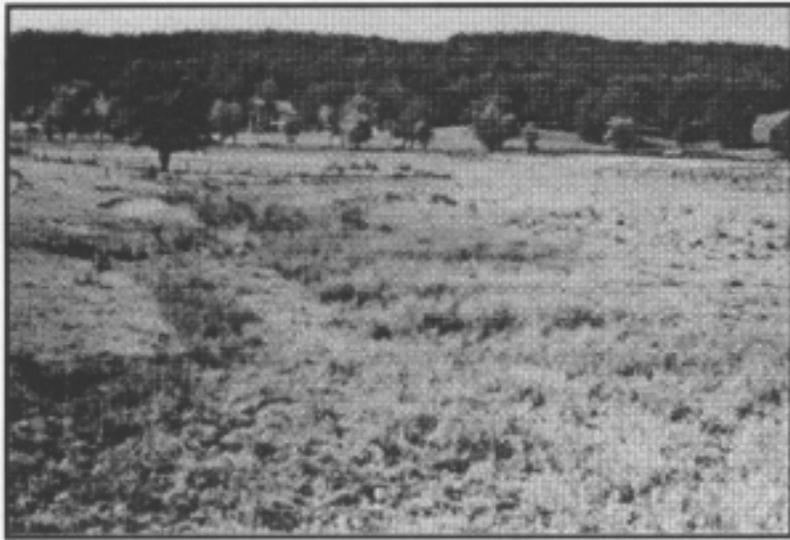
arrowhead



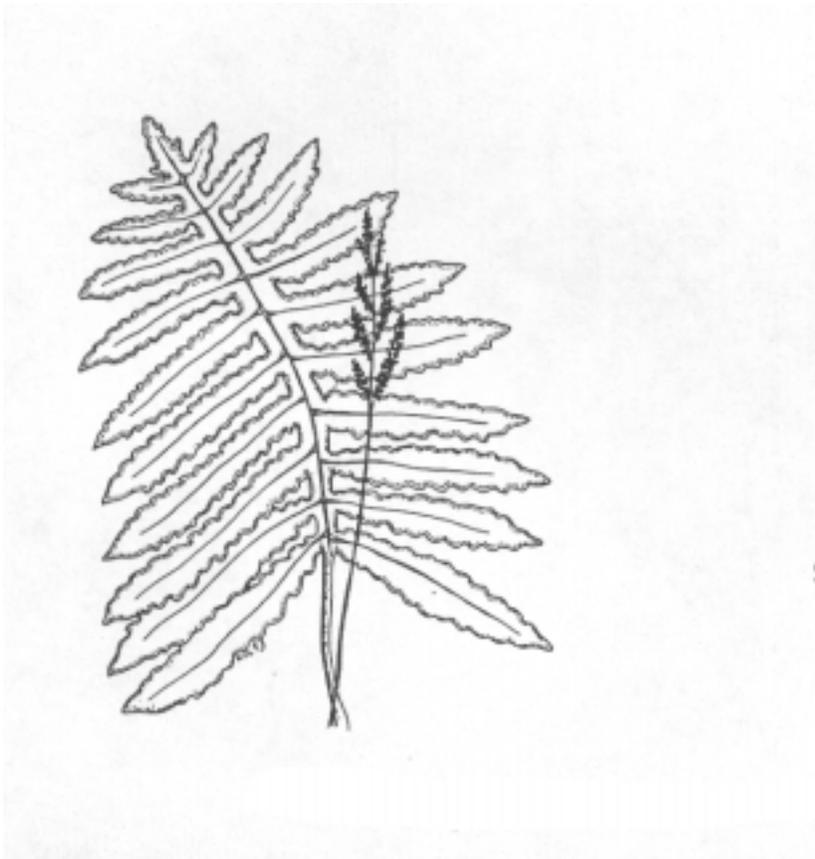
wild rice

WET MEADOWS

Wet Meadows are a type of marsh dominated by grasses or sedges. Water saturates the soil at a depth of six inches or less but generally is not visible on the surface most of the year.



purple loosestrife



sensitive fern



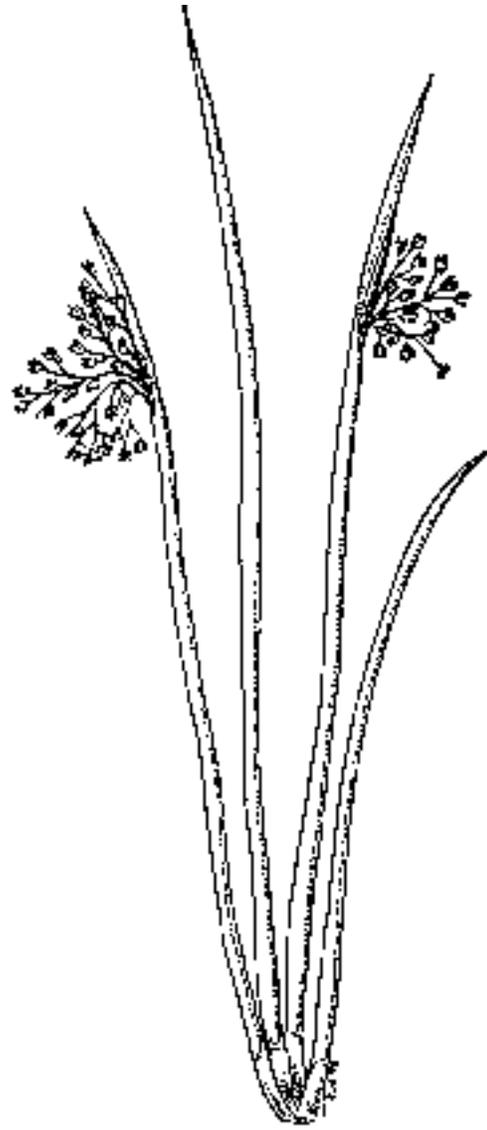
reed-canary grass

Characteristic Plants for Wet Meadows

Common name	Scientific name
reed-canary grass	<i>Phalaris arundinacea</i>
woolgrass	<i>Scirpus cyperinus</i>
purple loosestrife	<i>Lythrum salicaria</i>
sensitive fern	<i>Onoclea sensibilis</i>
soft rush	<i>Juncus effusus</i>



woolgrass



soft rush

SWAMPS

Swamps are wetlands dominated by woody trees or shrubs, which distinguish them from marshes. Swamps occur in isolated depressions or along borders of lakes, ponds, rivers, and streams. These wetlands are fed water through precipitation, flooded by water bodies such as lakes and streams, groundwater discharge, or a combination of these sources. Swamps may dry out completely during the summer, but all remain waterlogged from winter to spring.

Forested Wetlands

Forested wetlands, the most common wetland type in New England, are dominated by trees usually six meters or taller.



highbush blueberry



winterberry holly



green ash

Characteristic Plants for Forested Wetlands

Common name	Scientific name
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Trees & Saplings

northern white cedar	<i>Thuja occidentalis</i>
red maple	<i>Acer rubrum</i>
Atlantic white cedar	<i>Chamaecyparis thyoides</i>
black willow	<i>Salix nigra</i>
green ash	<i>Fraxinus pensylvanica</i>

Shrubs

highbush blueberry	<i>Vaccinium corymbosum</i>
winterberry holly	<i>Ilex verticillata</i>
spice bush	<i>Lindera benzoin</i>
swamp azalea	<i>Rhododendron viscosum</i>
silky dogwood	<i>Cornus amomum</i>

Groundcover

cinnamon fern	<i>Osmunda cinnamomea</i>
sensitive fern	<i>Onoclea sensibilis</i>
marsh marigold	<i>Caltha palustris</i>
royal fern	<i>Osmunda regalis</i>
dewberry	<i>Rubus hispidus</i>



silky dogwood



red maple



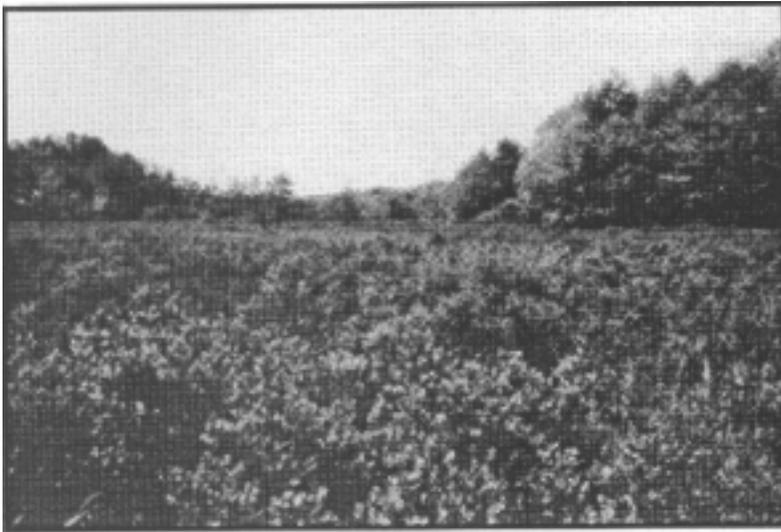
Atlantic white cedar



spice bush

Shrub Swamps

Shrub swamps are dominated by shrubs or young trees less than six meters tall.



buttonbush



sweet pepperbush



speckled alder

Characteristic Plants for Shrub Swamps

Common name Scientific name

Shrubs

buttonbush *Cephalanthus occidentalis*
 silky dogwood *Cornus amomum*
 sweet pepperbush *Clethra alnifolia*
 speckled alder *Alnus rugosa*
 swamp rose *Rosa palustris*

Groundcover

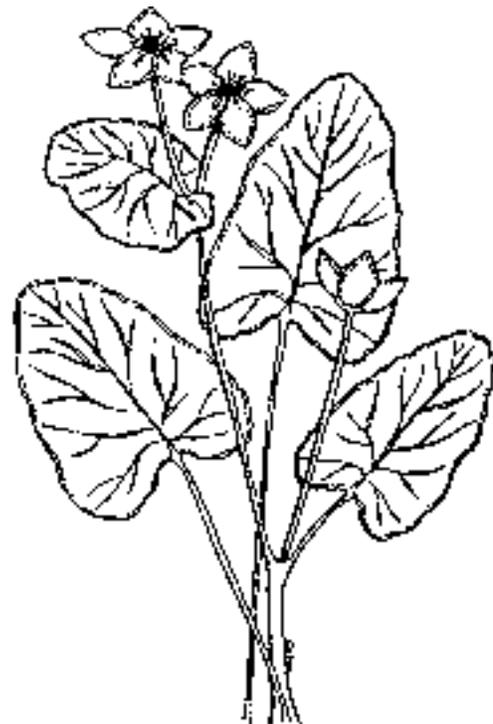
skunk cabbage *Symplocarpus foetidus*
 marsh marigold *Caltha palustris*
 jewelweed *Impatiens capensis*
 marsh fern *Thelypteris thelypteroides*
 sensitive fern *Onoclea sensibilis*



jewelweed



skunk cabbage



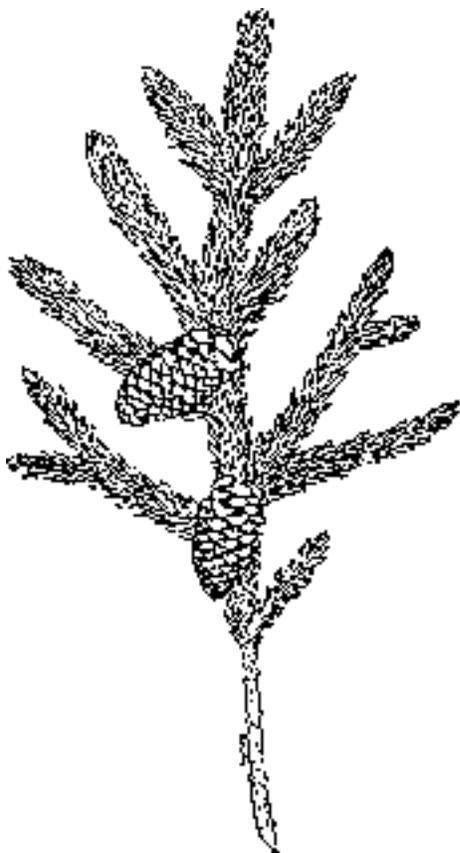
marsh marigold

BOGS AND FENS

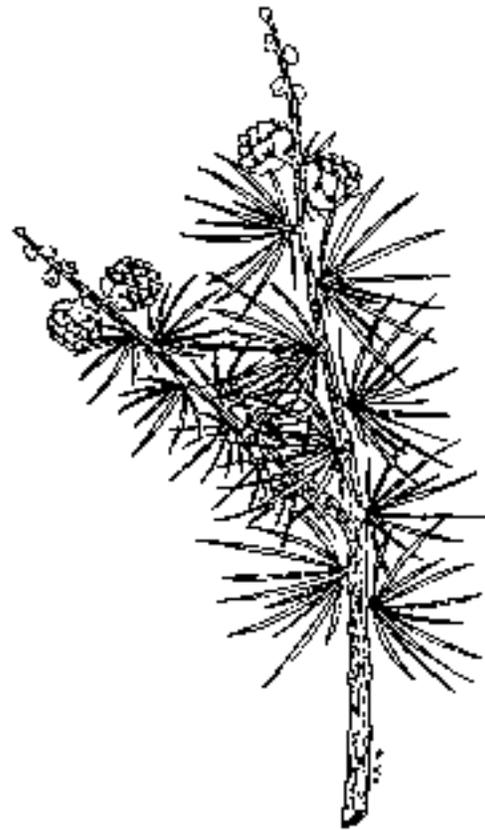
Bogs are peatlands that have no significant inflow or outflow of water and receive water mostly through precipitation. Because the main source of water is from precipitation, as opposed to groundwater, nutrient content is low. In addition, the soil is generally permanently saturated with water. As a result, few bacteria and soil microbes live in bog soils, creating very slow rates of plant decomposition. As plants die, they accumulate on the ground, eventually forming a thick mat of sphagnum moss and peat. Bogs are common in colder northern states such as Maine, Vermont, Wisconsin, Michigan, and Minnesota.

Bogs may eventually fill entirely with peat, giving way to the creation of a spruce or white cedar forest.

Fens are non-acidic peatlands that receive their water primarily from groundwater sources and a little from precipitation. Fens are more nutrient-rich than bogs and support a wider variety of species because of their connection to groundwater.



black spruce



tamarack

Characteristic Plants for Bogs and Fens

<u>Common name</u>	<u>Scientific name</u>
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Trees

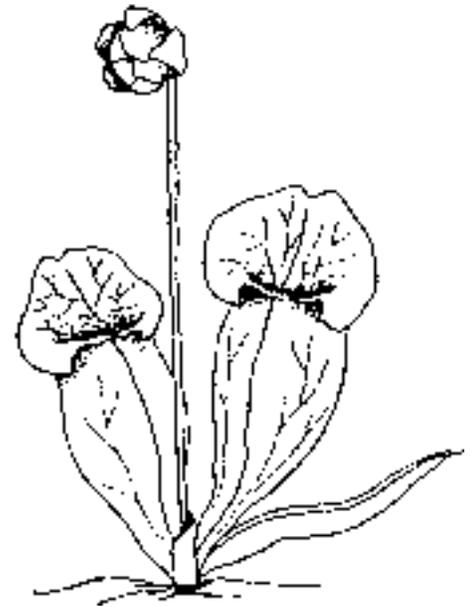
Atlantic white cedar	<i>Chamaecyparis Thyoides</i>
black spruce	<i>Picea mariana</i>
tamarack	<i>Larix laricina</i>

Shrubs

sweet gale	<i>Myrica gale</i>
leatherleaf	<i>Chamaedaphne calyculata</i>
swamp azalea	<i>Rhododendron viscosum</i>
cranberry	<i>Vaccinium oxycoccos</i>
bog laurel	<i>Kalmia palifolia</i>

Groundcover

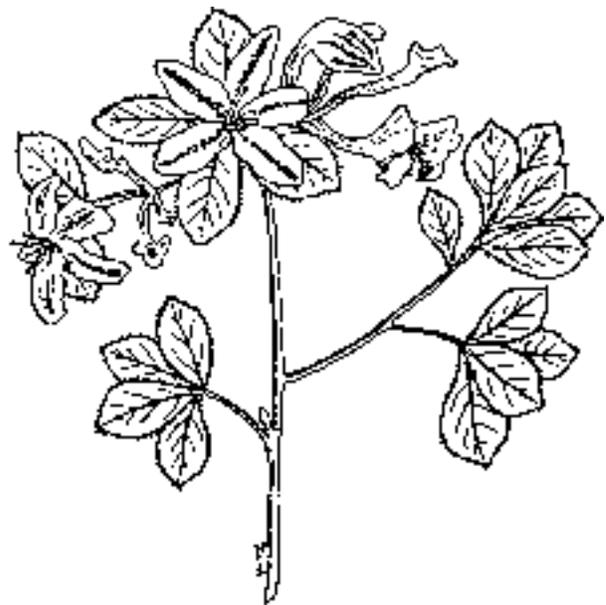
sphagnum moss	<i>Sphagnum spp.</i>
pitcher plant	<i>Sarracenia purpurea</i>
sundew	<i>Drosera spp.</i>
sedges	<i>Carex spp.</i>



pitcher plant



leatherleaf



swamp azalea

VERNAL POOLS

Vernal Pools are temporary pockets of freshwater found in depressions in wooded areas, meadows, and river floodplains throughout the U.S. These typically small and shallow pools are filled by spring rains and snowmelt and usually dry up during the summer months, though some persist year round. Though small and temporary, they provide a habitat essential to many creatures such as fairy shrimp, salamanders, and frogs which require vernal pools to complete at least a portion of their life cycle.



photo by Leo Kenney

Vernal Pool (Autumn)



photo by Leo Kenney

Vernal Pool (Summer)

An excellent reference to use with students is *Spring Pool: A Guide to the Ecology of Temporary Ponds*, published by the New England Aquarium. This glossy, hardcover text (55 pp.) includes several detailed color photos of vernal pools and a field guide to their inhabitants and is available for \$15.95 through the New England Aquarium gift shop (617) 973-5266.

Getting Your Students Involved:

Describe wetland types as habitats that support the lives of plants, wildlife, and humans. What kind of food, shelter, and space is afforded by different wetland types? What are the unique characteristics of wetlands as opposed to terrestrial sites?

There are many ways to distinguish wetlands, and although wetland professionals have formal methods for distinguishing them, students can create their own classification systems. One way to enter into teaching about the differences in wetland habitat is to have students create names for wetlands based on their characteristics. You can create cards that have plant types, soil types, and saturation or inundation periods, and wildlife names on them. Mix and group the cards. Have students draw pictures that show how they think this area would look based on the characteristics. Have them come up with a name that metaphorically describes the area.

As you walk out into the 'adopted' wetland, jot down the words being used by your students to describe the wetland. Have them brainstorm additional descriptive words and record them. When you return to the classroom, have the students create a poem, rap song, or picture of the wetland using only these descriptive words. Give the wetland a name that incorporates the most frequently used words.

Using formal classifications, describe the wetland you have visited. See if the class can identify its wetland from your description. Mix it in with the descriptions of other areas. The mystery is to find the one you have visited.

Guide to Wetland Wildlife in New England

SALT AND BRACKISH MARSHES

Birds

clapper rails, marsh wren, great egret, marsh hawk, great blue heron

Mammals

raccoon, mink, meadow vole

Reptiles

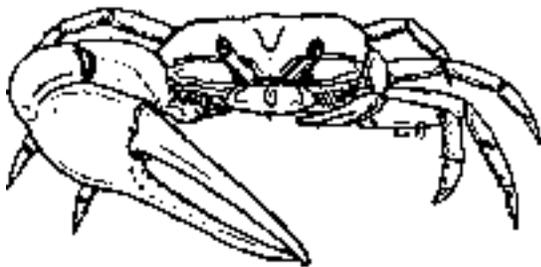
northern water snake (brackish), diamond-backed terrapin

Amphibians

spring peeper (brackish)

Invertebrates

fiddler crab



fiddler crab

FRESHWATER MARSHES

Birds

great blue heron, red-winged blackbird, mallard, Canada goose, marsh wren, wood duck, sora rail, marsh hawk, northern yellowthroat

Mammals

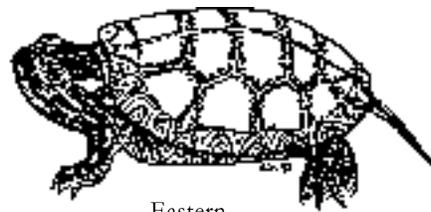
muskrat, raccoon, mink

Reptiles

ribbon snake, painted turtle, water snake, snapping turtle, northern water snake

Amphibians

bullfrog, green frog, spring peeper



Eastern painted turtle



muskrat

WET MEADOWS

Birds

great blue heron, mallard, sora,
song sparrow, swamp sparrow,
red-winged blackbird

Mammals

muskkrat, eastern cottontail, red fox,
whitetail deer, meadow vole

Reptiles

ribbon snake, eastern garter snake,
smooth green snake

Amphibians

leopard frog

FORESTED WETLANDS

Birds

wood duck, red-shouldered hawk,
tree swallow, barred owl, cedar waxwing, pileated
woodpecker

Mammals

beaver, raccoon, mink, white-tailed deer, snowshoe
hare, water shrew

Reptiles

wood turtle, spotted turtle, painted turtle, eastern
garter snake

Amphibians

spotted salamander, marble salamander, redback
salamander, red-spotted newt,
wood frog, leopard frog, pickerel frog



great blue heron



beaver

SHRUB SWAMPS

Birds

cedar waxwing, red-shouldered hawk, swamp sparrow, black-capped chickadee, yellow warbler

Mammals

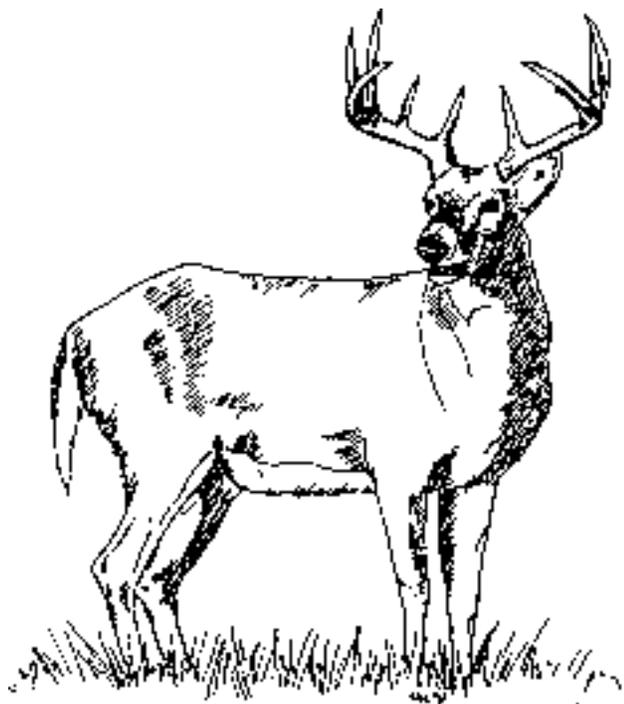
beaver, muskrat, raccoon, river otter, white-tailed deer, opossum

Reptiles

Blanding's turtle, spotted turtle, wood turtle, northern water snake, snapping turtle

Amphibians

gray tree frog, spring peeper



white-tailed deer

BOGS

Birds

yellow-bellied flycatcher, palm warbler

Mammals

water shrew, bog lemming

Reptiles

bog turtle

Amphibians

four-toed salamander, gray tree frog



gray tree frog



raccoon

VERNAL POOLS

Birds

great blue heron, ducks, geese, songbirds

Mammals

raccoon, muskrat, shrews, voles, mice

Reptiles

painted turtle, spotted turtle, snapping turtle

Amphibians

spotted salamander*, Jefferson's salamander*, four-toed salamander, green frog, wood frog*, spring peeper, American toad

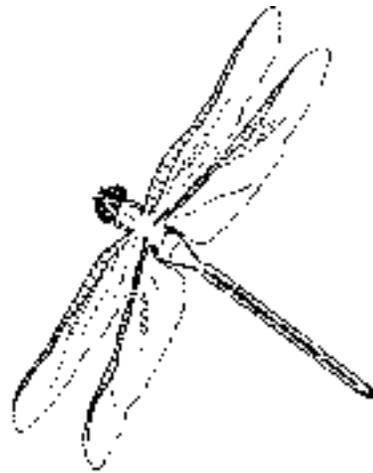
Invertebrates

caddisfly, damselfly, dragonfly, fairy shrimp*, whirligig beetle, water flea

* *Obligate species*



spotted salamander *



dragonfly



ducks

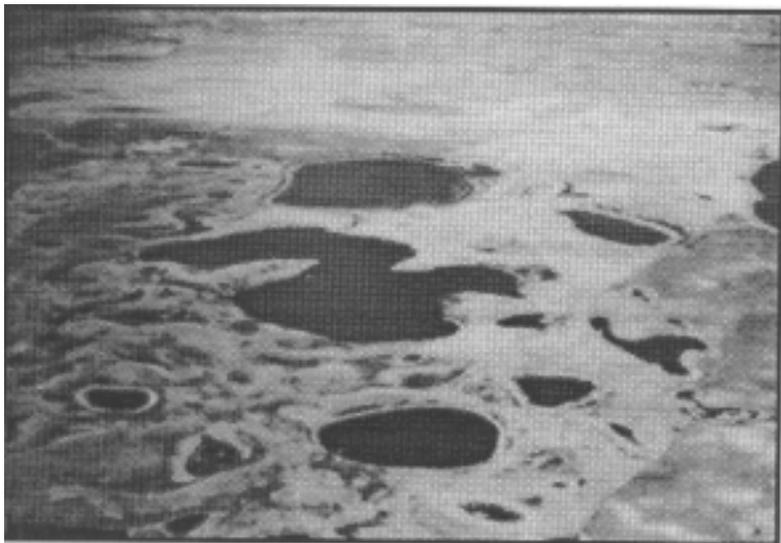
Regional Wetland “Celebrities”

The following are some of the better known wetland systems in the U.S. Many of them are distinguished by the unique regional ecological conditions that created them. Being familiar with wetlands from other parts of the country will give your students exposure to the “bigger picture” of wetlands as a global natural resource. (See Activity 1, *Put It On the Map!*)

Prairie Potholes

— *shallow, marsh-like ponds found in parts of Minnesota, the Dakotas and the adjacent Canadian provinces*

They are known as the “duck factory” of North America because of the large number of ducks using the area as a stopover during migration from wintering grounds in the south to nesting grounds in the north. At one time the prairie potholes were widespread and abundant. Today they are greatly reduced in distribution and number due to drainage for agriculture.



Prairie Potholes

Pocosins

— *evergreen shrub bogs found along the Atlantic Coastal Plain from Virginia to northern Florida*

Pocosins are particularly dominant in North Carolina. The word “pocosin” comes from the Algonquin Indian phrase for “swamp on a hill.” They are classified as bogs because of their resemblance to the nutrient-poor, acidic wetlands normally found in much colder climates.

Wet Tundra or Muskegs

— *vast plateaus of peat found in Alaska and Canada*

Mangrove Swamps

— *coastal wetlands found in the tropical and subtropical regions of the world*

They are common in Hawaii and in southern Florida. These wetlands are dominated by woody plants called mangroves that have multibranched, tangled, thick root systems emerging from the soil. Their extensive root system protects the shoreline from erosion and storm damage. Mangroves are among the few woody plants capable of tolerating the salinity of the open ocean. They have developed special adaptations that prevent salt from entering the roots and excrete it through the leaves.



Bottomland Hardwoods

Bottomland Hardwood Forests

— forested wetlands located in low-lying areas along river floodplains

These rapidly disappearing flooded forests are found in southeastern states such as Louisiana.

Okefenokee Swamp

— an Indian word that means “land of the trembling earth” because of its numerous floating islands of vegetation

The Okefenokee, located in southeastern Georgia and northeastern Florida, actually encompasses six different wetland types: pond cypress forest, emergent and aquatic bed prairie, broad-leaved evergreen forest, broad-leaved shrub wetland, mixed cypress forest, and black gum forest.

The Mississippi River Delta

Located at the mouth of the largest river in the U.S., it is one of the richest marsh and swamp wetland systems in the world.

San Francisco Bay

A large portion of the Bay used to be an enormous estuarine salt marsh, but nearly 95% has been lost since the Gold Rush of 1849.

The Great Kankakee Swamp

Before land clearing for agriculture began about 100 years ago, this swamp was one of the largest marsh-swamp complexes in the U.S. interior, located in northwestern Indiana and northeastern Illinois. The Kankakee River which fed this wetland system was channelized in the late 19th century. This process eventually eradicated the great swamp by the late 1930's.

The Florida Everglades

— often referred to as a “river of grass” for the vast expanses of sawgrass that dominate the area

The Everglades also have an abundance of tropical plants including hardwoods, palms, and orchids.